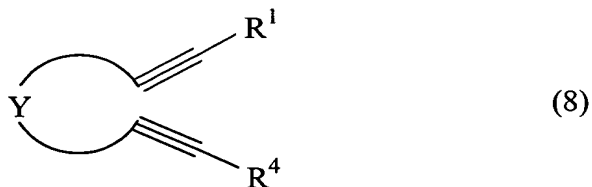


CLAIMS:

1. A process for producing an organotitanium compound which comprises reacting an acetylene compound represented by the formula (8) below in the presence of a titanium compound represented by the formula (2) below and a Grignard reagent represented by the formula (3) below with a compound represented by the formula (5) below, thereby giving said titanium compound represented by the formula (9) and/or (10) below



where  $R^1$  denotes a  $C_{1-20}$  alkyl group {which may be substituted with a  $C_{1-6}$  alkoxy group (which may be substituted with a phenyl group) or  $OSiR^7R^8R^9$  (where  $R^7$ ,  $R^8$ , and  $R^9$  denote mutually independently a  $C_{1-6}$  alkyl group or phenyl group)},  $C_{3-20}$  alkenyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, di- $C_{1-6}$ -alkylaminocarbonyl group, phenyl group (which may be substituted with a  $C_{1-6}$  alkyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, or di- $C_{1-6}$ -alkylaminocarbonyl group), furyl group, amino group,  $SiR^7R^8R^9$  (where  $R^7$ ,  $R^8$ , and  $R^9$  are defined as above), or  $SnR^{10}R^{11}R^{12}$  (where  $R^{10}$ ,  $R^{11}$ , and  $R^{12}$  denote

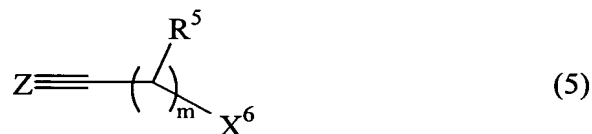
mutually independently a halogen atom, C<sub>1-6</sub> alkyl group, or phenyl group); R<sup>4</sup> denotes a hydrogen atom, C<sub>1-20</sub> alkyl group, C<sub>1-6</sub> alkoxy group, C<sub>1-6</sub> alkoxycarbonyl group, C<sub>1-6</sub> alkylaminocarbonyl group, di-C<sub>1-6</sub>-alkylaminocarbonyl group, phenyl group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, C<sub>1-6</sub> alkoxycarbonyl group, C<sub>1-6</sub> alkylaminocarbonyl group, or di-C<sub>1-6</sub>-alkylaminocarbonyl group), furyl group, amino group, SiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above), or SnR<sup>10</sup>R<sup>11</sup>R<sup>12</sup> (where R<sup>10</sup>, R<sup>11</sup>, and R<sup>12</sup> are defined as above); and Y denotes Z<sup>1</sup>-Z<sup>2</sup>-Z<sup>3</sup> or Z<sup>4</sup>-Z<sup>5</sup>-Z<sup>6</sup>-Z<sup>7</sup> {where Z<sup>1</sup>, Z<sup>3</sup>, Z<sup>4</sup>, Z<sup>5</sup>, and Z<sup>7</sup> denote mutually independently C=O or CR<sup>14</sup>R<sup>15</sup> (where R<sup>14</sup> and R<sup>15</sup> denote mutually independently a hydrogen atom or C<sub>1-6</sub> alkyl group (which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above))), Z<sup>2</sup> and Z<sup>6</sup> denote mutually independently O, S, C=O, NR<sup>16</sup> (where R<sup>16</sup> denotes a C<sub>1-6</sub> alkyl group (which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above))), or CR<sup>14'</sup>R<sup>15'</sup> (where R<sup>14'</sup> and R<sup>15'</sup> denote mutually independently a hydrogen atom or C<sub>1-6</sub> alkyl group (which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above))))}



where  $\text{X}^1$ ,  $\text{X}^2$ ,  $\text{X}^3$ , and  $\text{X}^4$  denote mutually independently a halogen atom,  $\text{C}_{1-6}$  alkoxy group {which may be substituted with a phenyl group (which may be substituted with a  $\text{C}_{1-6}$  alkyl group,  $\text{C}_{1-6}$  alkoxy group, or phenyl group), or a naphthyl group)}, phenoxy group (which may be substituted with a  $\text{C}_{1-6}$  alkyl group,  $\text{C}_{1-6}$  alkoxy group, or phenyl group), or naphthoxy group

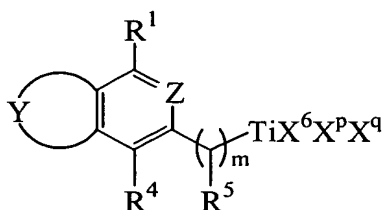


where R denotes a  $\text{C}_{2-8}$  alkyl group having a hydrogen atom at the  $\beta$  position, and  $\text{X}^5$  denotes a halogen atom

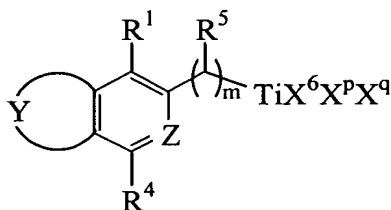


where  $\text{R}^5$  denotes a hydrogen atom,  $\text{C}_{1-20}$  alkyl group, or phenyl group (which may be substituted with a  $\text{C}_{1-6}$  alkyl group,  $\text{C}_{1-6}$  alkoxy group,  $\text{C}_{1-6}$  alkoxycarbonyl group,  $\text{C}_{1-6}$  alkylaminocarbonyl group, or di- $\text{C}_{1-6}$ -alkylaminocarbonyl group), Z denotes  $\text{CR}'$  (where  $\text{R}'$  denotes a hydrogen atom or  $\text{C}_{1-20}$  alkyl group) or a nitrogen atom;  $\text{X}^6$  denotes a halogen atom,  $\text{C}_{1-6}$  alkoxy group {which may be substituted with a phenyl group (which may be substituted with a  $\text{C}_{1-6}$  alkyl group,  $\text{C}_{1-6}$  alkoxy group, and phenyl group), or naphthyl group}, phenoxy group (which may be substituted with a  $\text{C}_{1-6}$  alkyl group,  $\text{C}_{1-6}$  alkoxy group, or phenyl group), naphthoxy group,  $\text{SO}_n\text{R}^6$  {where  $\text{R}^6$  denotes a  $\text{C}_{1-6}$

alkyl group or phenyl group (which may be substituted with a halogen atom or C<sub>1-6</sub> alkyl group) and n denotes 1 or 2}, OSO<sub>2</sub>R<sup>6</sup> (where R<sup>6</sup> is defined as above), or OP(O)(OR<sup>13</sup>)<sub>2</sub> group (where R<sup>13</sup> denotes a C<sub>1-6</sub> alkyl group); and m denotes 0 or 1



(9)



(10)

where R<sup>1</sup>, R<sup>4</sup>, R<sup>5</sup>, Y, Z, X<sup>6</sup>, and m are defined as above; and X<sup>p</sup> and X<sup>q</sup> denote any of X<sup>1</sup> ~ X<sup>4</sup> (which are defined as above).

2. A process for producing an organotitanium compound which comprises reacting an acetylene compound represented by the formula (1) below in the presence of a titanium compound represented by the formula (2) below and a Grignard reagent represented by the formula (3) below with a compound represented by the formula (11) below, thereby giving said titanium compound represented by the formula (12) below



where R<sup>1</sup> and R<sup>2</sup> denote mutually independently a C<sub>1-20</sub> alkyl group {which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> denote mutually independently a C<sub>1-6</sub> alkyl group or

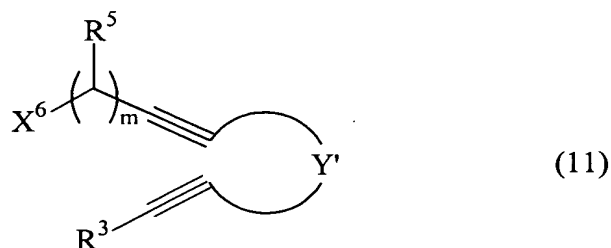
phenyl group)}, C<sub>3-20</sub> alkenyl group, C<sub>1-6</sub> alkoxy group, C<sub>1-6</sub> alkoxy carbonyl group, C<sub>1-6</sub> alkylaminocarbonyl group, di-C<sub>1-6</sub>-alkylaminocarbonyl group, phenyl group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, C<sub>1-6</sub> alkoxy carbonyl group, C<sub>1-6</sub> alkylaminocarbonyl group, or di-C<sub>1-6</sub>-alkylaminocarbonyl group), furyl group, amino group, SiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above), or SnR<sup>10</sup>R<sup>11</sup>R<sup>12</sup> (where R<sup>10</sup>, R<sup>11</sup>, and R<sup>12</sup> denote mutually independently a halogen atom, C<sub>1-6</sub> alkyl group, or phenyl group)



where X<sup>1</sup>, X<sup>2</sup>, X<sup>3</sup>, and X<sup>4</sup> denote mutually independently a halogen atom, C<sub>1-6</sub> alkoxy group {which may be substituted with a phenyl group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), or a naphthyl group}, phenoxy group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), or naphthoxy group)

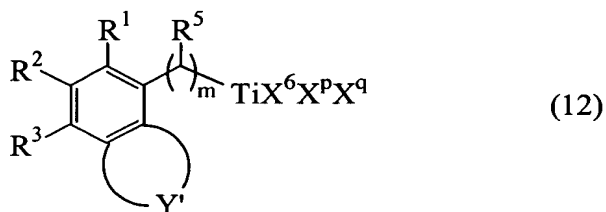


where R denotes a C<sub>2-8</sub> alkyl group having a hydrogen atom at the β position, and X<sup>5</sup> denotes a halogen atom



where  $R^3$  denotes a hydrogen atom,  $C_{1-20}$  alkyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, di- $C_{1-6}$ -alkylaminocarbonyl group, phenyl group (which may be substituted with a  $C_{1-6}$  alkyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, or di- $C_{1-6}$ -alkylaminocarbonyl group), furyl group, amino group,  $SiR^7R^8R^9$  ( $R^7$ ,  $R^8$ , and  $R^9$  are defined as above), or  $SnR^{10}R^{11}R^{12}$  (where  $R^{10}$ ,  $R^{11}$ , and  $R^{12}$  are defined as above);  $R^5$  denotes a hydrogen atom,  $C_{1-20}$  alkyl group, or phenyl group (which may be substituted with a  $C_{1-6}$  alkyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, or di- $C_{1-6}$ -alkylaminocarbonyl group);  $Y'$  denotes  $Z^1-Z^2-Z^3$  or  $Z^4-Z^5-Z^6-Z^7$  {where  $Z^1$ ,  $Z^3$ ,  $Z^4$ ,  $Z^5$ , and  $Z^7$  denote mutually independently  $C=O$  or  $CR^{14}R^{15}$  (where  $R^{14}$  and  $R^{15}$  denote mutually independently a hydrogen atom or  $C_{1-6}$  alkyl group (which may be substituted with a  $C_{1-6}$  alkoxy group (which may be substituted with a phenyl group) or  $OSiR^7R^8R^9$  (where  $R^7$ ,  $R^8$ , and  $R^9$  are defined as above))),  $Z^2$  and  $Z^6$  denote mutually independently  $O$ ,  $S$ ,  $C=O$ ,  $NR^{16}$  (where  $R^{16}$  denotes a  $C_{1-6}$  alkyl group (which may be

substituted with C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group)) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above)), or CR<sup>14'</sup>R<sup>15'</sup> (where R<sup>14'</sup> and R<sup>15'</sup> denote mutually independently a hydrogen atom, C<sub>1-6</sub> alkyl group (which may be substituted with a C<sub>1-6</sub> alkoxy group (which may be substituted with a phenyl group) or OSiR<sup>7</sup>R<sup>8</sup>R<sup>9</sup> (where R<sup>7</sup>, R<sup>8</sup>, and R<sup>9</sup> are defined as above)))); X<sup>6</sup> denotes a halogen atom, C<sub>1-6</sub> alkoxy group {which may be substituted with a phenyl group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), or naphthyl group}, phenoxy group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), naphthoxy group, SO<sub>n</sub>R<sup>6</sup> {where R<sup>6</sup> denotes a C<sub>1-6</sub> alkyl group or phenyl group (which may be substituted with a halogen atom or C<sub>1-6</sub> alkyl group), and n denotes 1 or 2}, OSO<sub>2</sub>R<sup>6</sup> (where R<sup>6</sup> is defined as above), or OP(O)(OR<sup>13</sup>)<sub>2</sub> group (where R<sup>13</sup> denotes a C<sub>1-6</sub> alkyl group); and m denotes 0 or 1

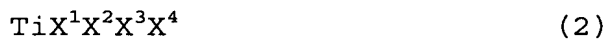


where R<sup>1</sup> to R<sup>3</sup>, R<sup>5</sup>, Y', X<sup>6</sup>, and m are defined as above; and X<sup>p</sup> and X<sup>q</sup> denote any of X<sup>1</sup> ~ X<sup>4</sup> (which are defined as above).

3. A process for producing an organotitanium compound which comprises reacting an acetylene compound represented by the formula (1) below in the presence of a titanium compound represented by the formula (2) below and a Grignard reagent represented by the formula (3) below with a compound represented by the formula (13) below, thereby giving said titanium compound represented by the formula (14) below



where  $R^1$  and  $R^2$  denote mutually independently a  $C_{1-20}$  alkyl group {which may be substituted with a  $C_{1-6}$  alkoxy group (which may be substituted with a phenyl group) or  $OSiR^7R^8R^9$  (where  $R^7$ ,  $R^8$ , and  $R^9$  denote mutually independently a  $C_{1-6}$  alkyl group or phenyl group)},  $C_{3-20}$  alkenyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, di- $C_{1-6}$ -alkylaminocarbonyl group, phenyl group (which may be substituted with a  $C_{1-6}$  alkyl group,  $C_{1-6}$  alkoxy group,  $C_{1-6}$  alkoxycarbonyl group,  $C_{1-6}$  alkylaminocarbonyl group, or di- $C_{1-6}$ -alkylaminocarbonyl group), furyl group, amino group,  $SiR^7R^8R^9$  (where  $R^7$ ,  $R^8$ , and  $R^9$  denote mutually independently a  $C_{1-6}$  alkyl group or phenyl group), or  $SnR^{10}R^{11}R^{12}$  (where  $R^{10}$ ,  $R^{11}$ , and  $R^{12}$  denote mutually independently a halogen atom,  $C_{1-6}$  alkyl group, or phenyl group).



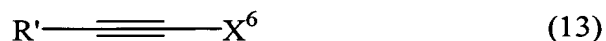
where  $X^1$ ,  $X^2$ ,  $X^3$ , and  $X^4$  denote mutually independently a halogen atom,  $C_{1-6}$  alkoxy group {which may be substituted with a phenyl



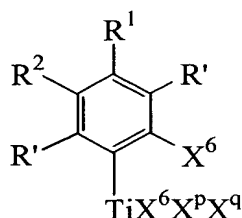
group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group) or naphthyl group}, phenoxy group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), or naphthoxy group



where R denotes a C<sub>2-8</sub> alkyl group having a hydrogen atom at the β position, and X<sup>5</sup> denotes a halogen atom



where R' denotes a hydrogen atom or C<sub>1-20</sub> alkyl group; and X<sup>6</sup> denotes a halogen atom, C<sub>1-6</sub> alkoxy group {which may be substituted with a phenyl group (which may be substituted with a C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group) or naphthyl group}, phenoxy group (which may be substituted with C<sub>1-6</sub> alkyl group, C<sub>1-6</sub> alkoxy group, or phenyl group), naphthoxy group, SO<sub>n</sub>R<sup>6</sup> group {where R<sup>6</sup> denotes a C<sub>1-6</sub> alkyl group or phenyl group (which may be substituted with a halogen atom or C<sub>1-6</sub> alkyl group), and n denotes 1 or 2}, OSO<sub>2</sub>R<sup>6</sup> (where R<sup>6</sup> is defined as above), or OP(O)(OR<sup>13</sup>)<sub>2</sub> group (where R<sup>13</sup> denotes a C<sub>1-6</sub> alkyl group)



(14)

where R<sup>1</sup>, R<sup>2</sup>, R', Z, and X<sup>6</sup> are defined as above; and X<sup>p</sup> and X<sup>q</sup> denote any of X<sup>1</sup> to X<sup>4</sup> (which are defined as above).

4. A process for producing an organotitanium compound as defined in any of Claims 1 to 3, wherein the titanium compound is tetra-*i*-propoxytitanium.

5. A process for producing an organotitanium compound as defined in any of Claims 1 to 3, wherein the Grignard reagent is an *i*-propyl Grignard reagent.

6. A process for addition reaction which comprises adding to the organotitanium compound obtained by the process defined in any of Claims 1 to 3 a compound having an aldehyde group, ketone group, imino group, aliphatic double bond, aliphatic triple bond, acyl group or ester group or an electrophilic reagent of water, heavy water, iodine or oxygen, and performing addition reaction on the organotitanium compound to produce a polysubstituted benzene or polysubstituted pyridine.